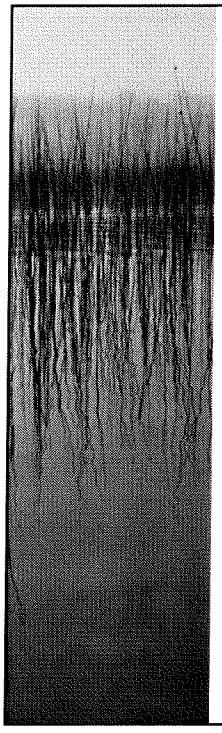


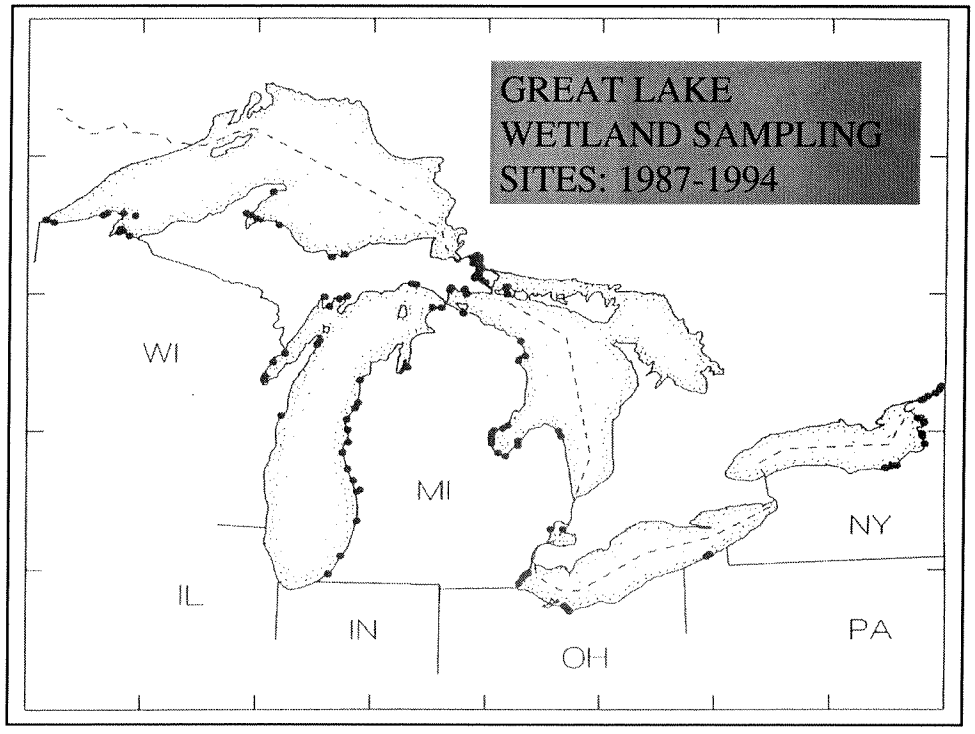
Vegetation Response to Management of Coastal Wetlands on Saginaw and Grand Traverse Bays

Dr. Dennis Albert, Ecologist

Michigan Natural Features Inventory

Email: *albertd@michigan.gov*

(517) 373-1552



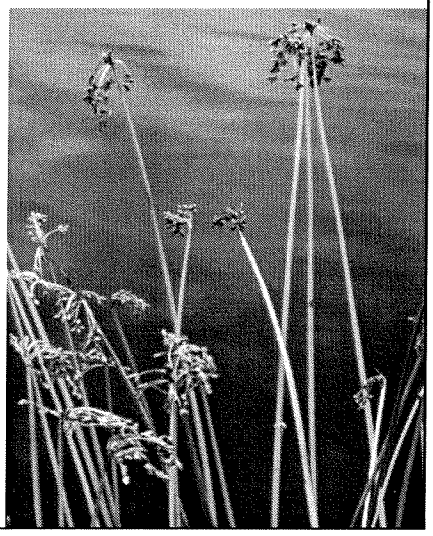
Coastal Wetland Values

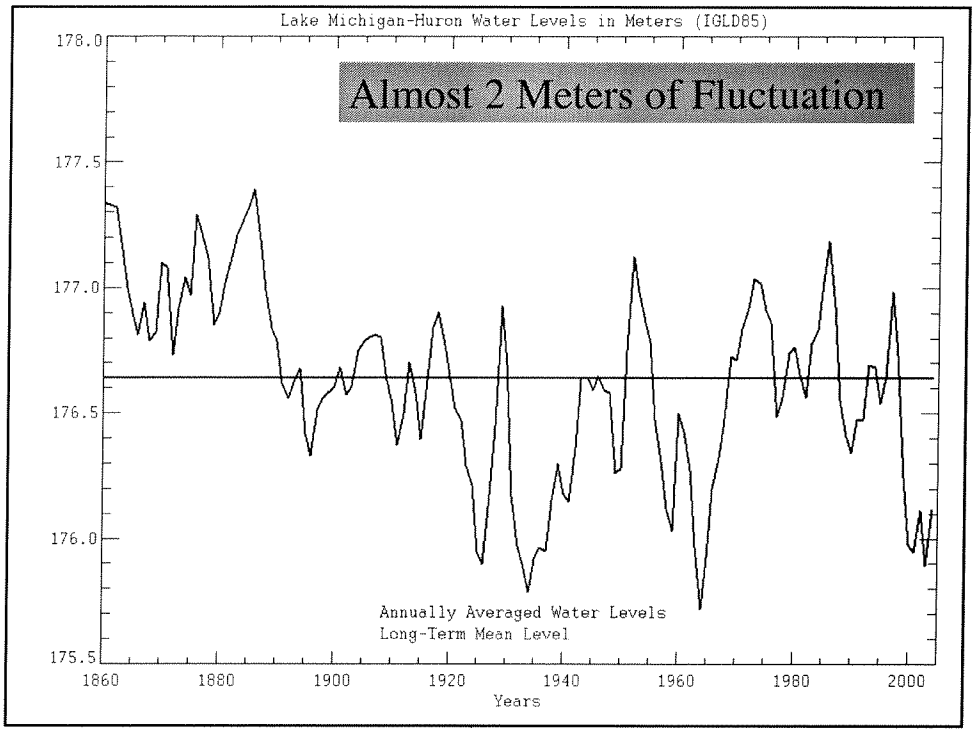
- Fisheries Habitat
- Wildlife Habitat
- Coastal Processes:
  - Sediment Trapping
  - Erosion Control

Sediment trapping and erosion control

Bulrushes most important species for sediment trapping:

- Hardstem
- Softstem
- Three-square





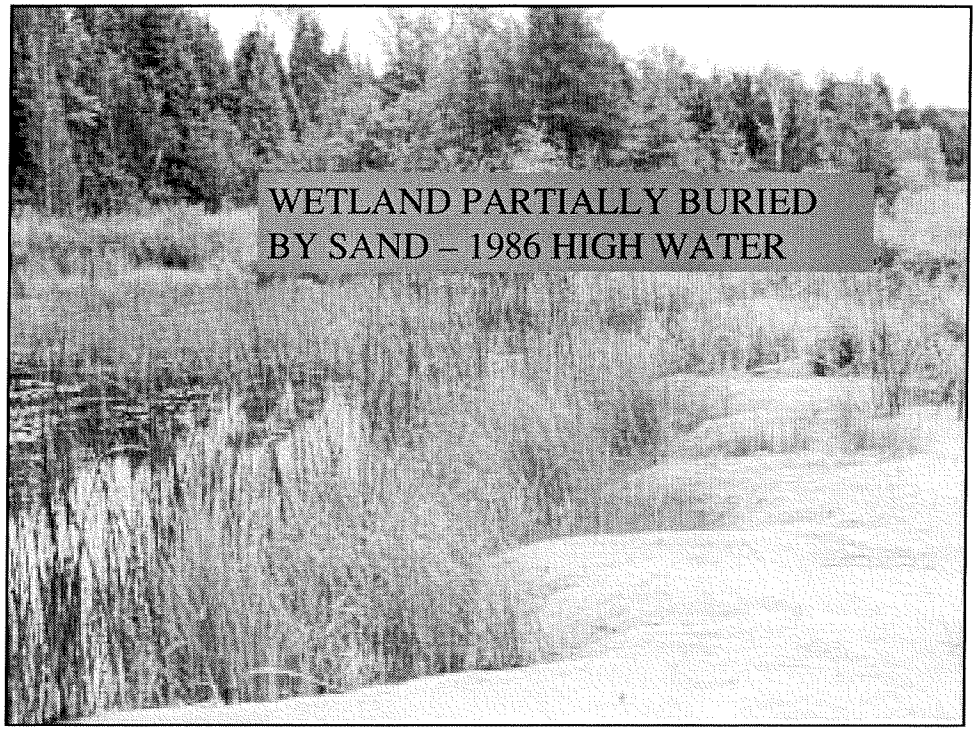
Inter-annual water level changes result in major vegetation changes

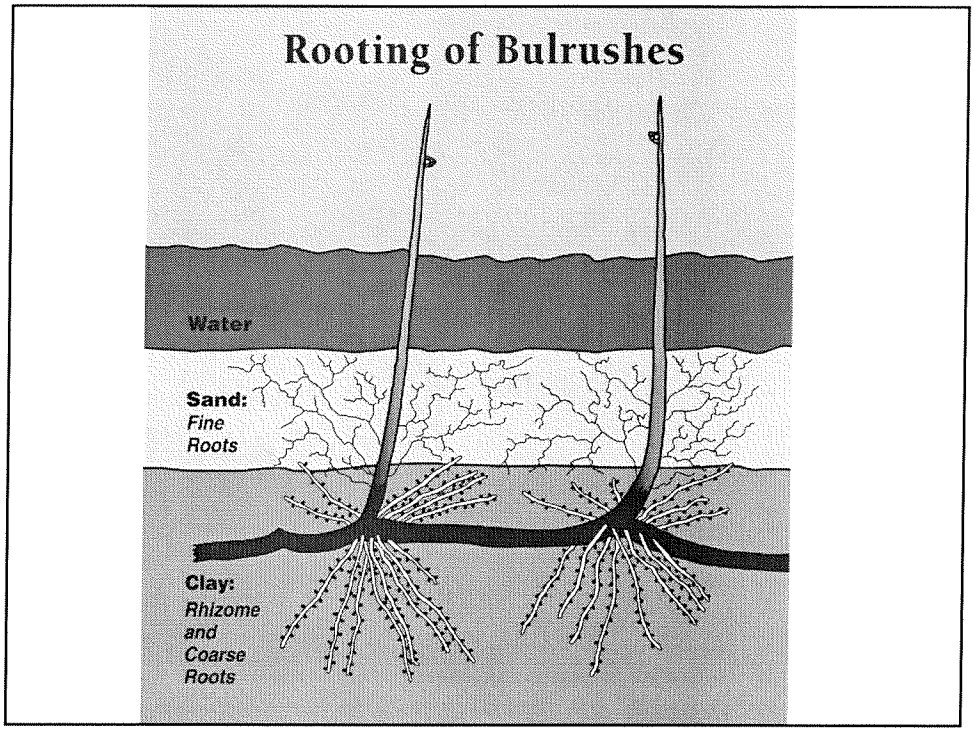
Pinconning outer bay

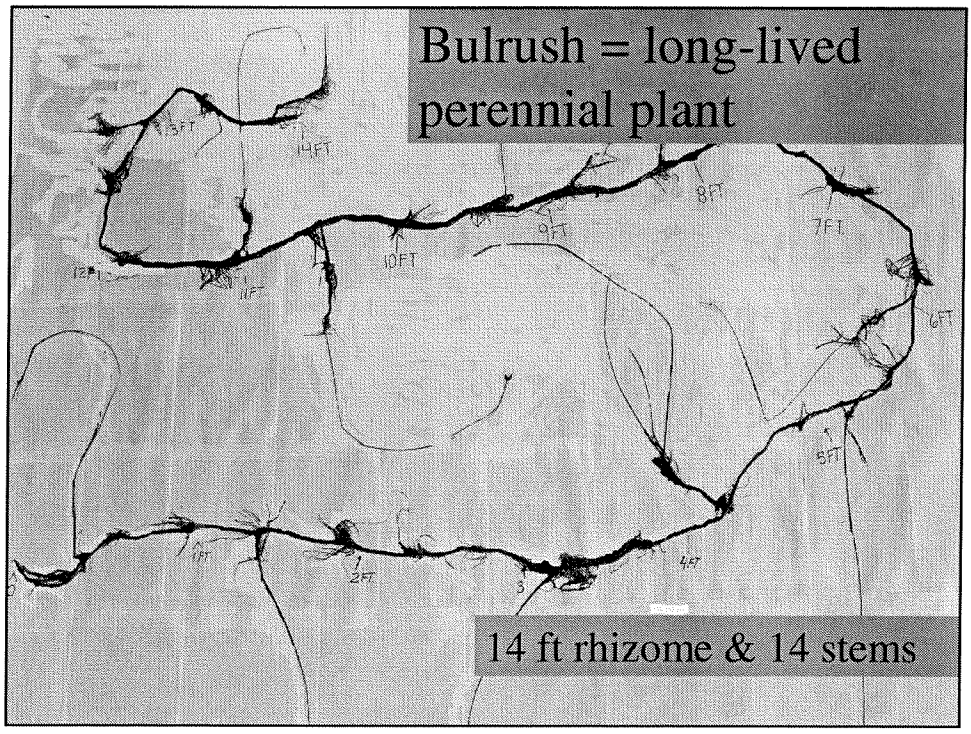
high water (1988): vegetation erosion

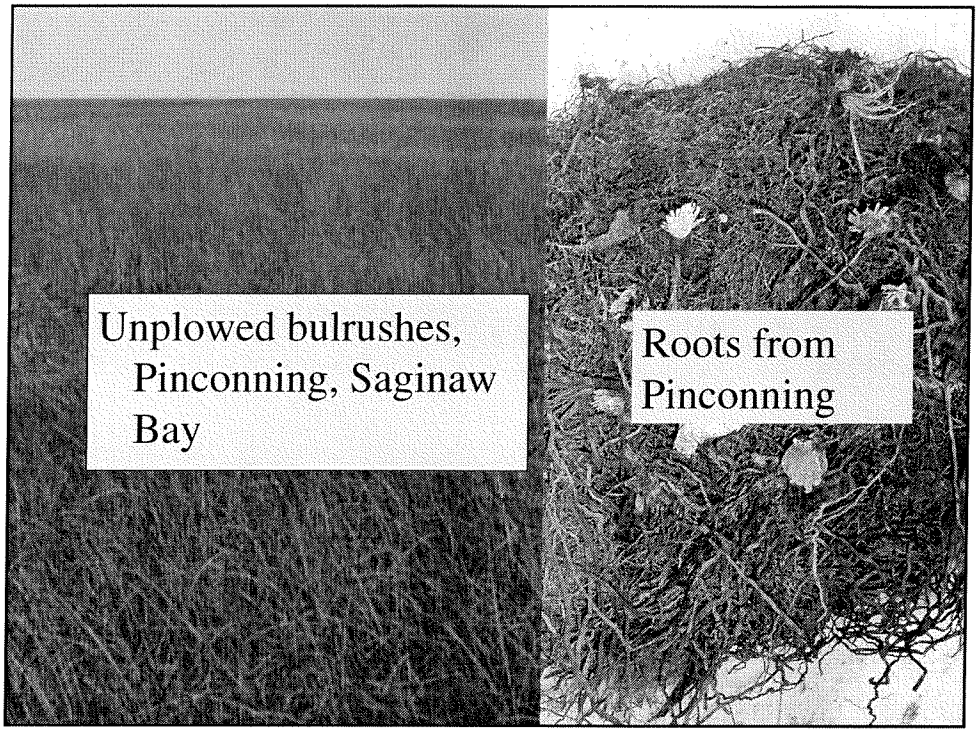
low water (2001): vegetation expansion

Erosion of bulrush rhizomes: 1986 extreme high water levels.



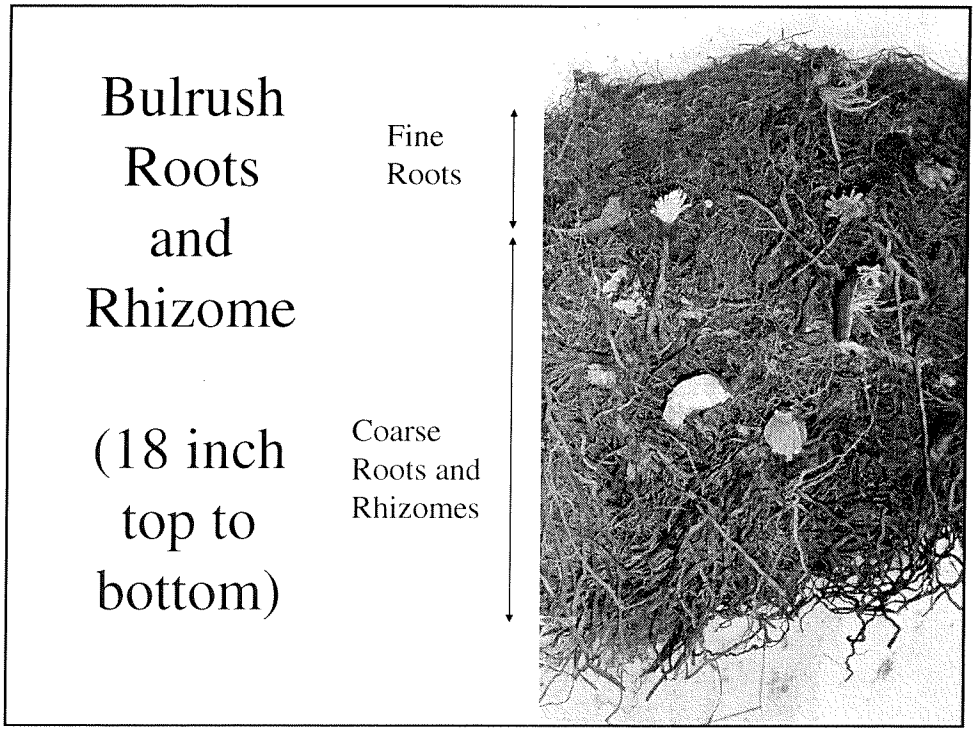

Rooting of Bulrushes
Water
Sand:
Fine
Roots
Clay:
Rhizome
and
Coarse
Roots

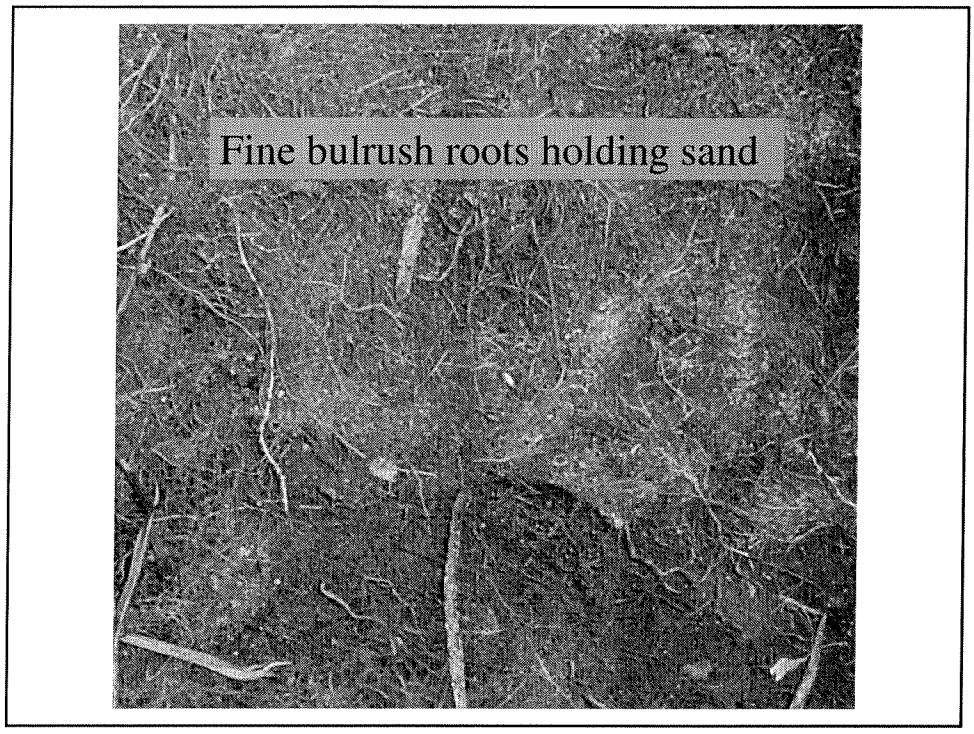

Bulrush = long-lived perennial plant
14 ft rhizome & 14 stems

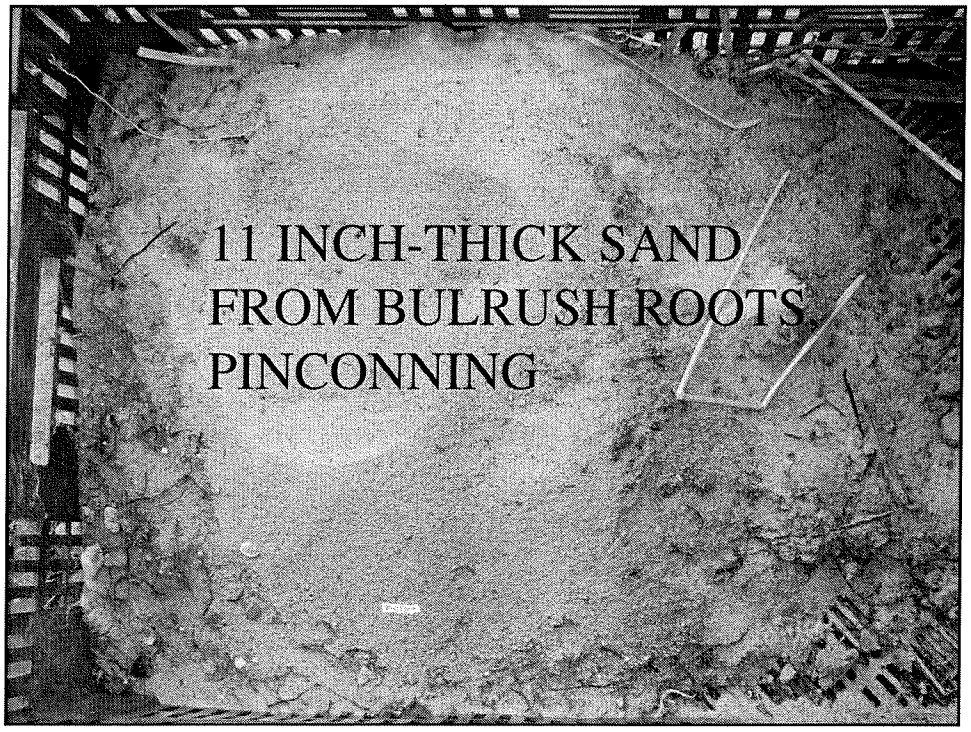


Bulrush Roots and Rhizome

(18 inch top to bottom)

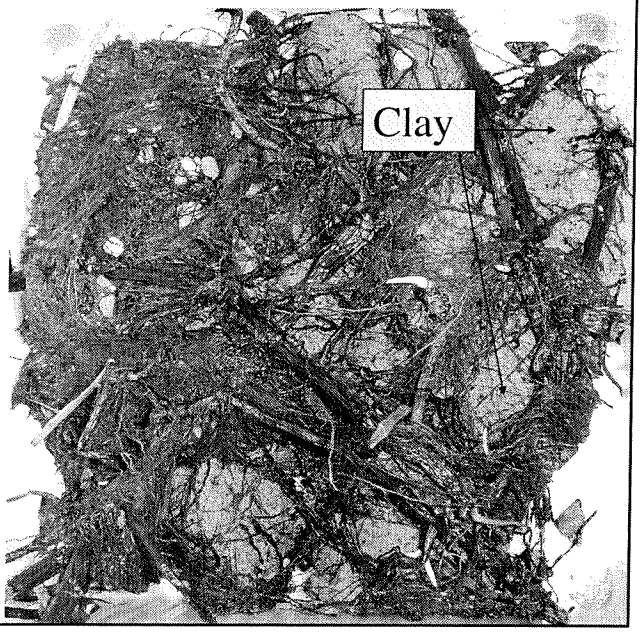



Fine bulrush roots holding sand


11 INCH-THICK SAND
FROM BULRUSH ROOTS
PINCONNING

Roots after storm at Pinconning:

- Surface sand eroded – less than 2 inches
- Very few fine roots remain
- Rhizomes in subsurface clay



STUDYING THE EFFECTS OF MANAGEMENT ON WETLAND VEGETATION:

- PLOWING OR RAKING
- MOWING
- HAND PULLING
- FILLING

PAIRED PLOTS

UNMANAGED PLOTS
compared to:

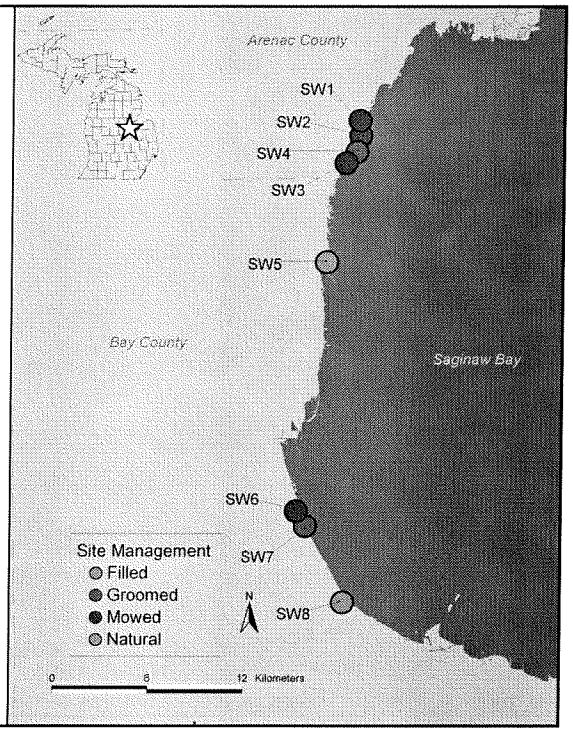
- MOWED
- RAKED OR PLOWED
- HAND-PULLED PLANTS

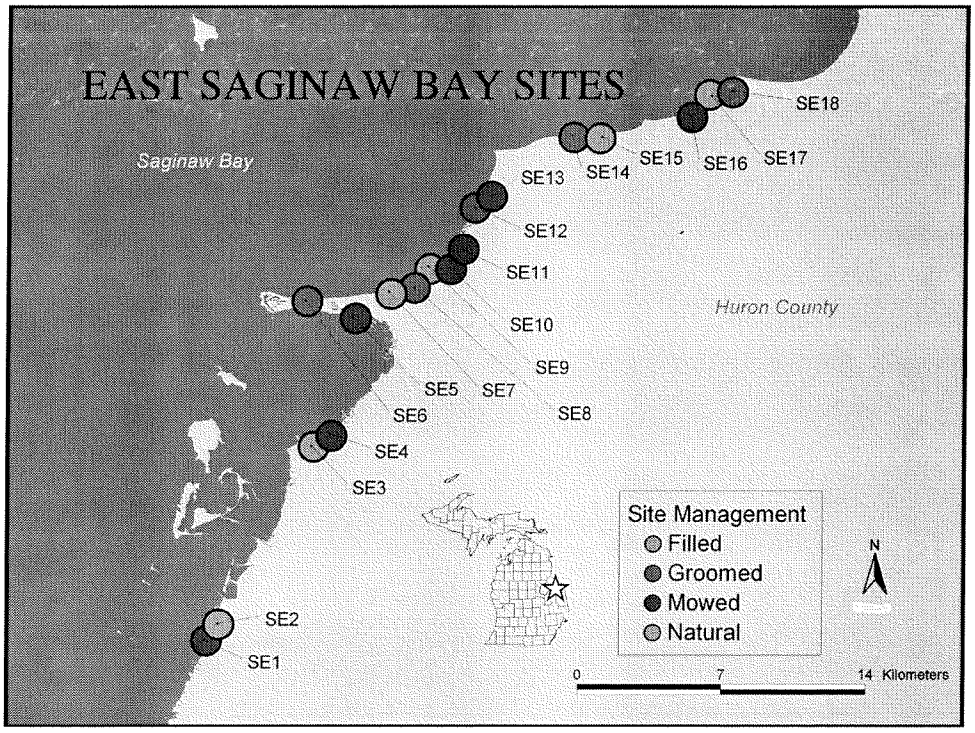
SAMPLING COMPARISON

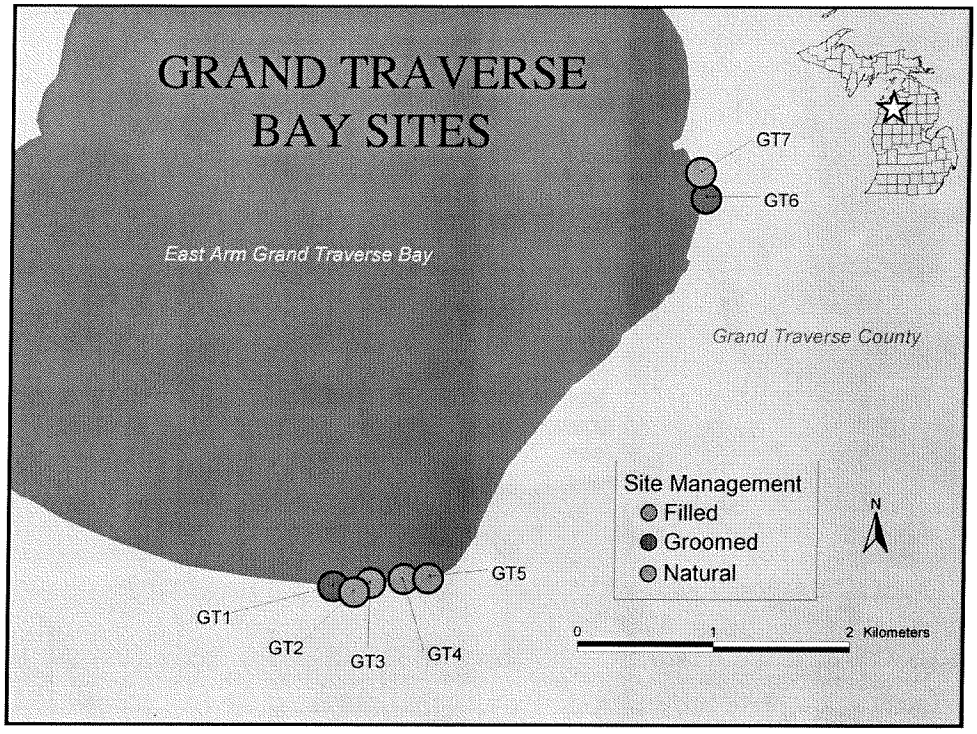
SAMPLING TOOLS

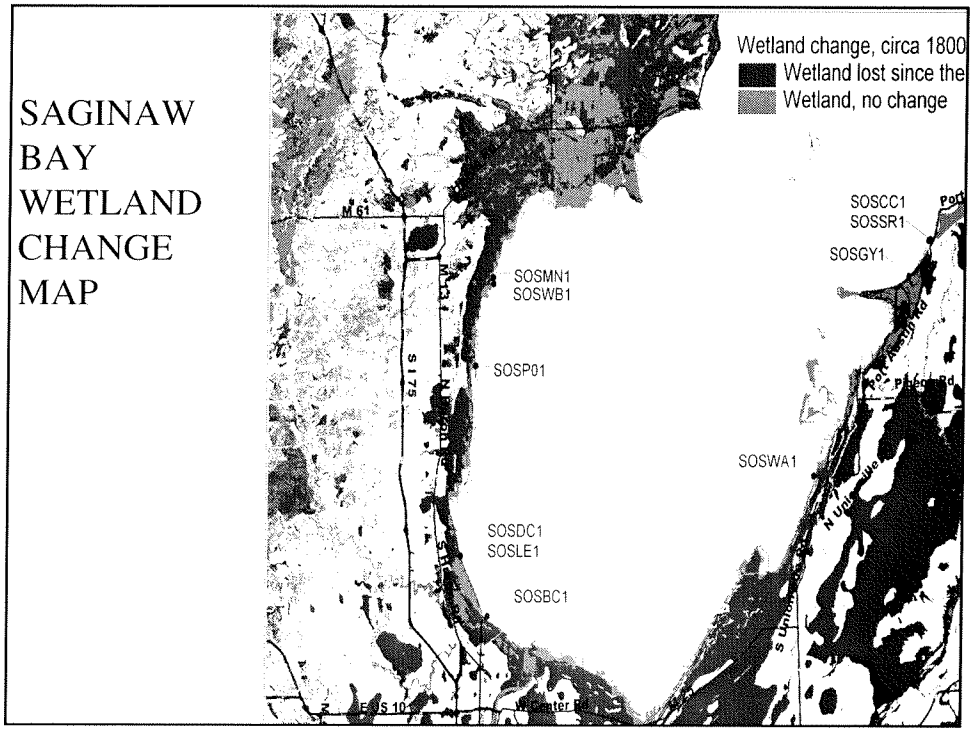
SAMPLING AREAS

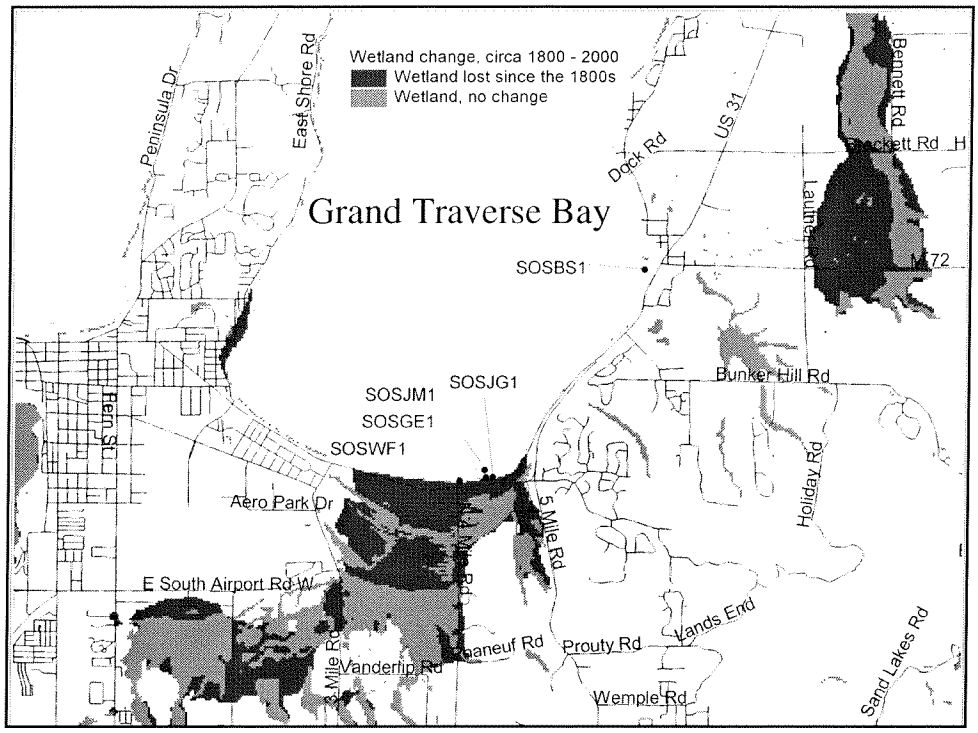
WEST SAGINAW BAY SITES






GRAND TRAVERSE
BAY SITES
GT7
GT6
East Arm Grand Traverse Bay
Grand Traverse County
Site Management
Filled
Groomed
Natural
N
GT5
GT1
GT2
GT3
GT4
0
1
2 Kilometers

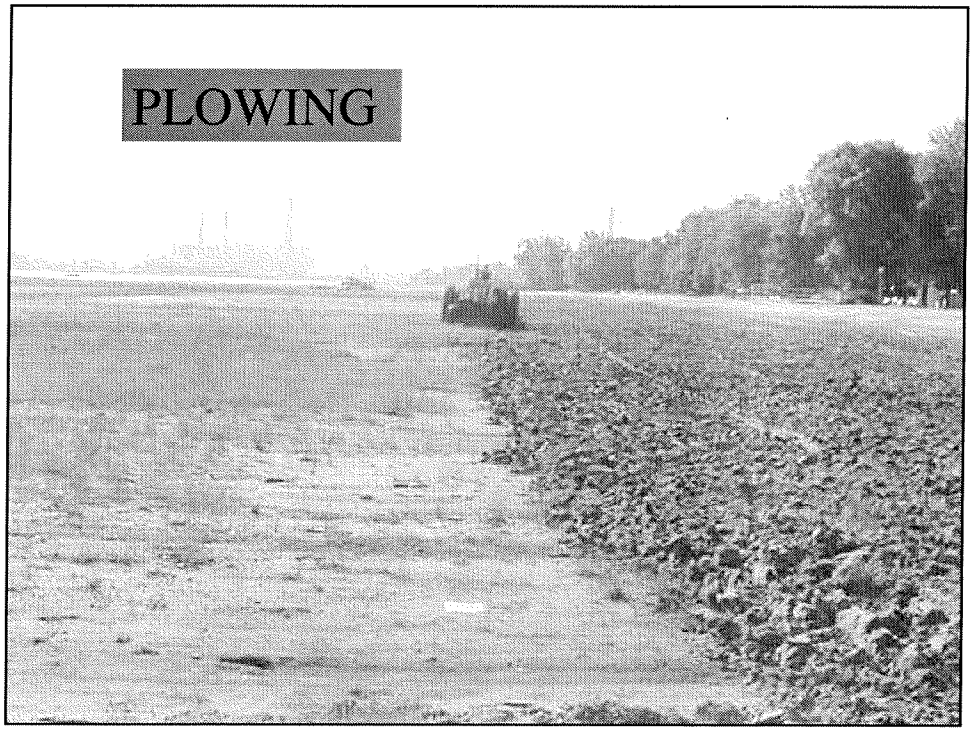

SAGINAW
BAY
WETLAND
CHANGE
MAP
Wetland change, circa 1800
Wetland lost since the
Wetland, no change
M 61
SOSCC1
SOSSR1
SOSGY1
SOSMN1
SOSWB1
SOSP01
SOSWA1
SOSDC1
SOSLE1
SOSBC1
S 175



TYPE OF MANAGEMENT AND EFFECT ON VEGETATION AND SOIL

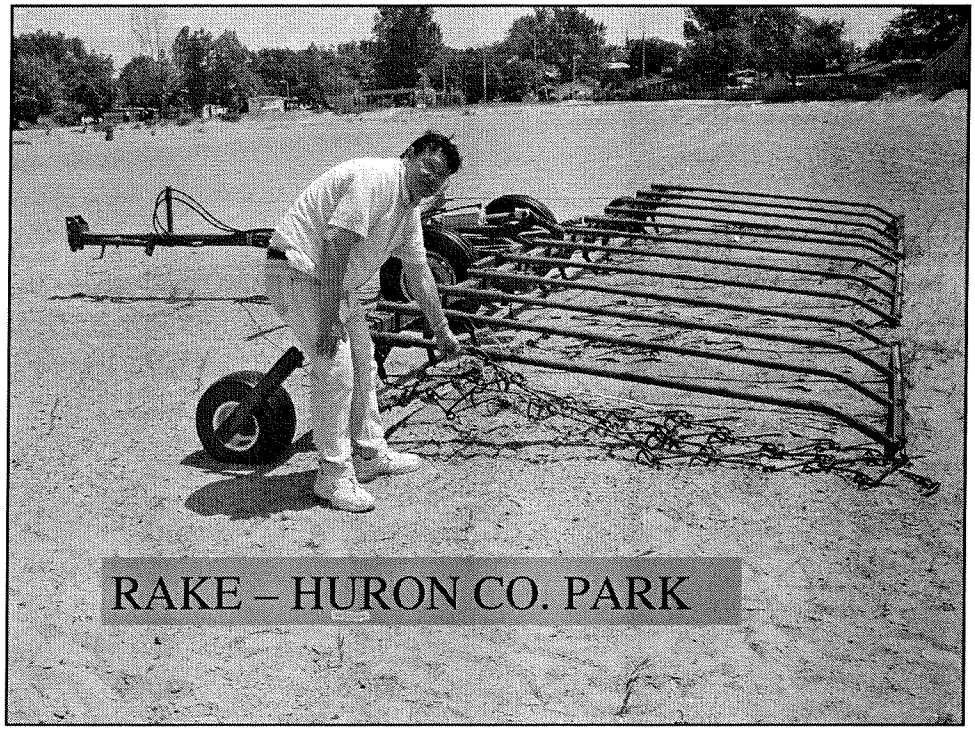
UNMANAGED SITE –

ABUNDANT STEMS AND ROOTS

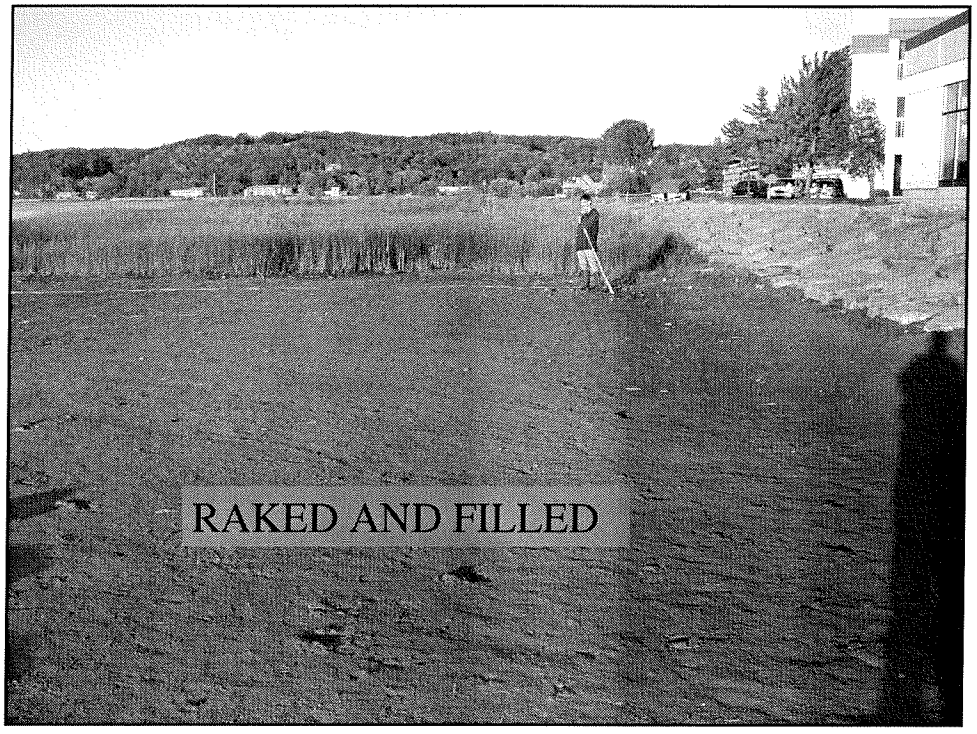


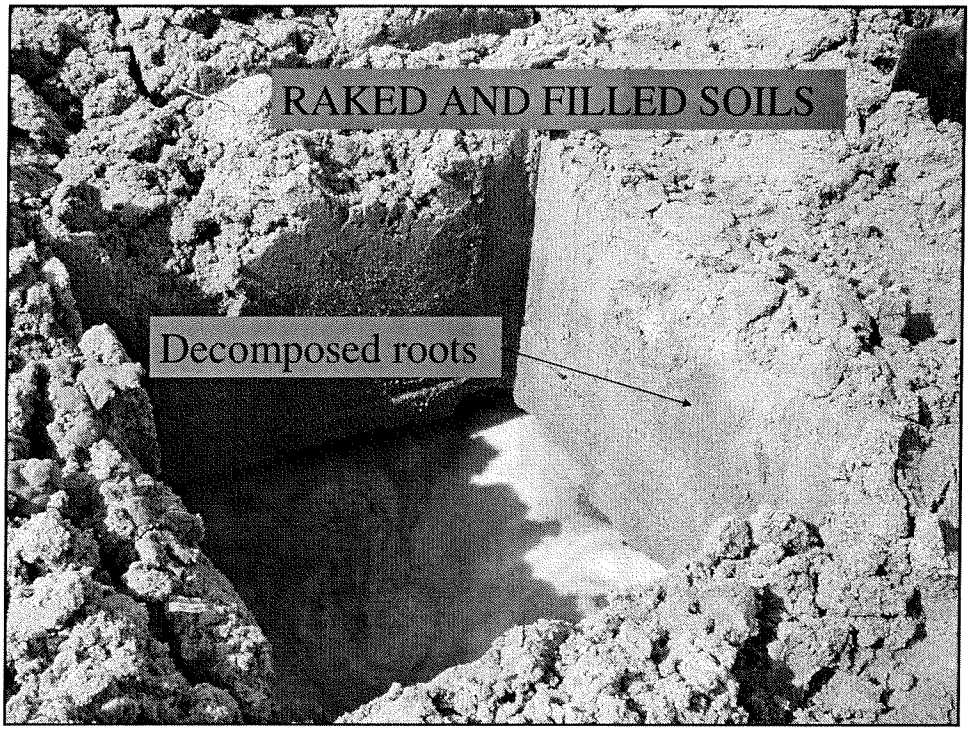
PLOWING

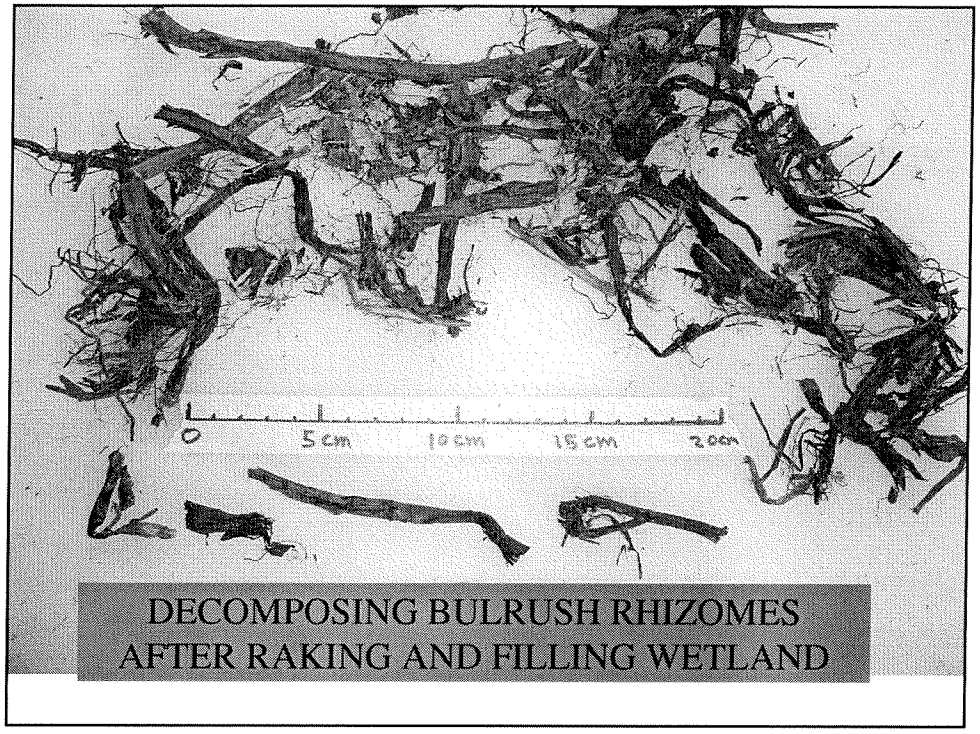
Loss of bulrushes from plowing



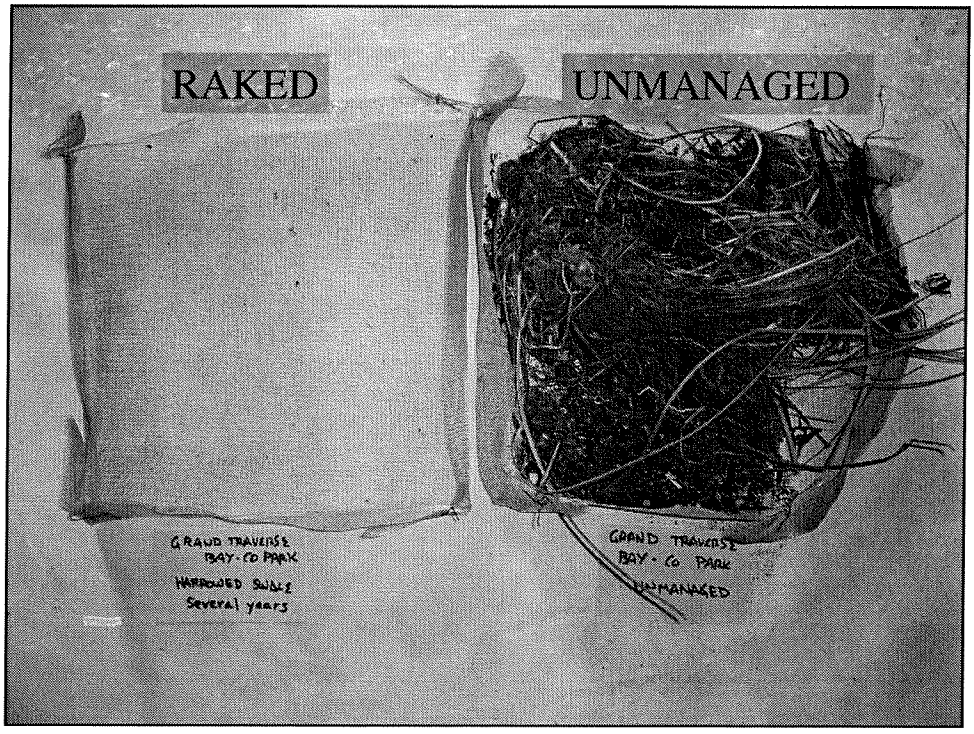
RAKE – HURON CO. PARK

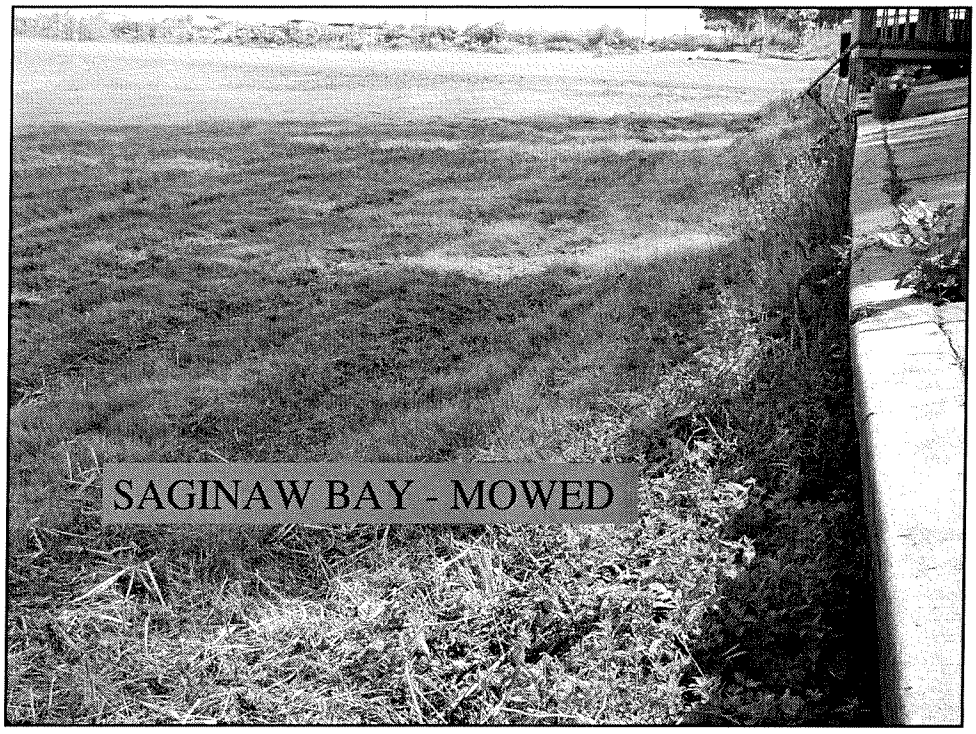

RAKED AND FILLED


RAKED AND FILLED SOILS
Decomposed roots

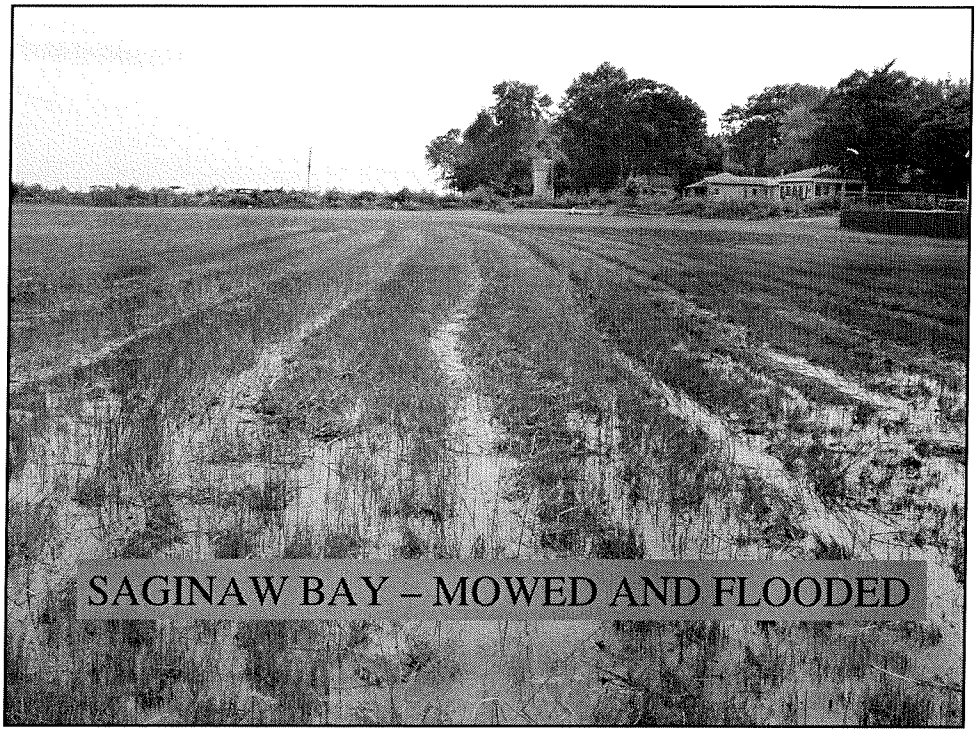


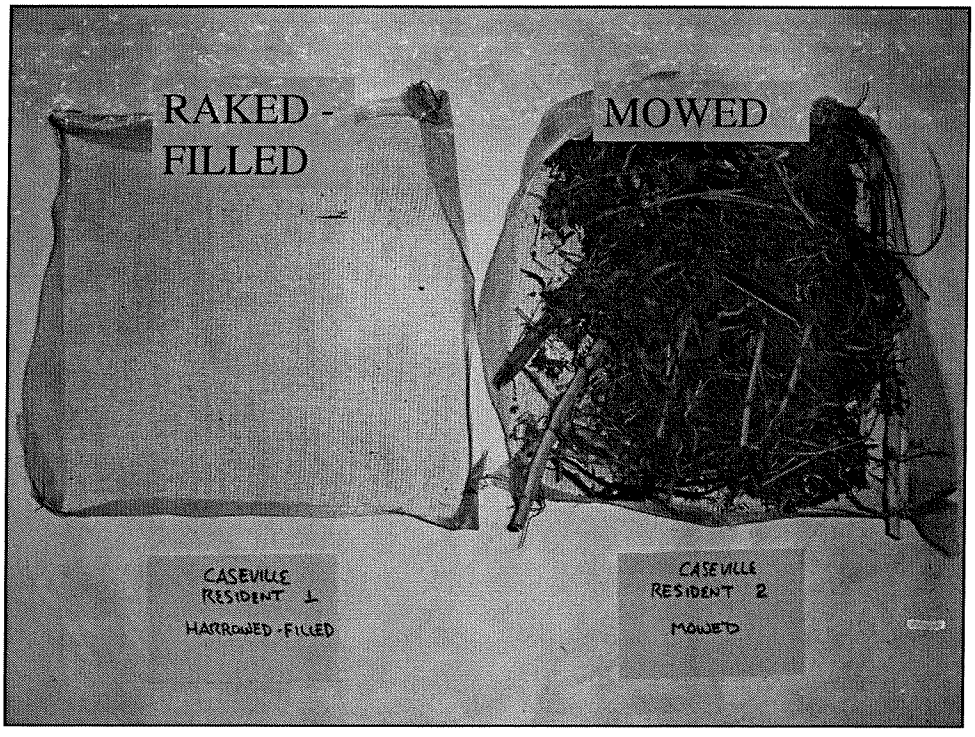
DECOMPOSING BULRUSH RHIZOMES
AFTER RAKING AND FILLING WETLAND

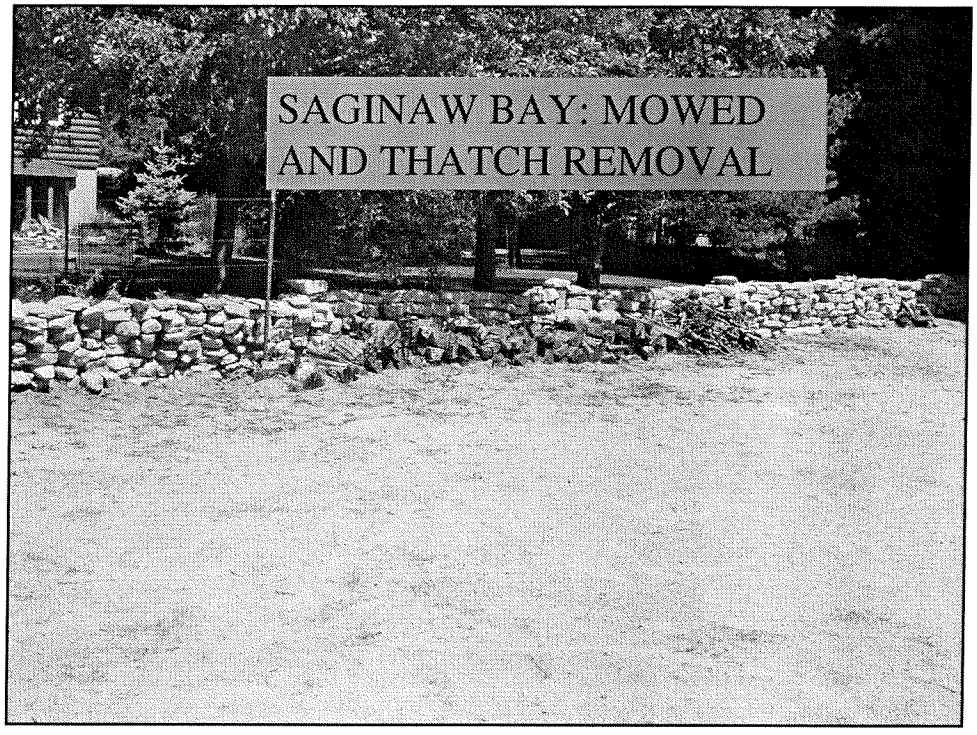



SAGINAW BAY - MOWED

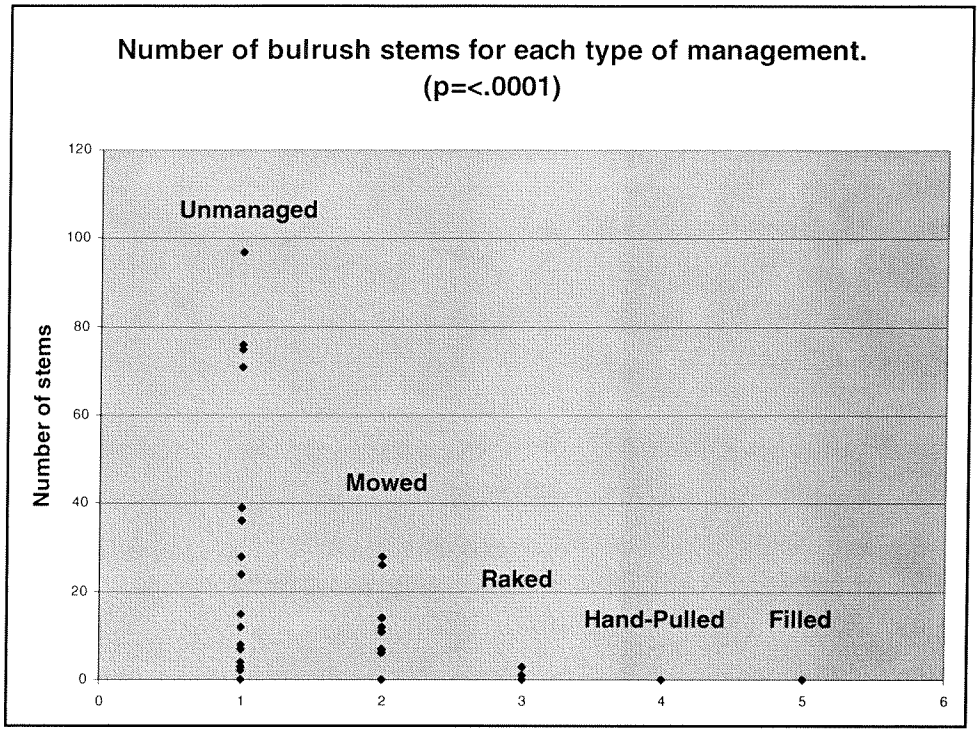

MOWED SOILS

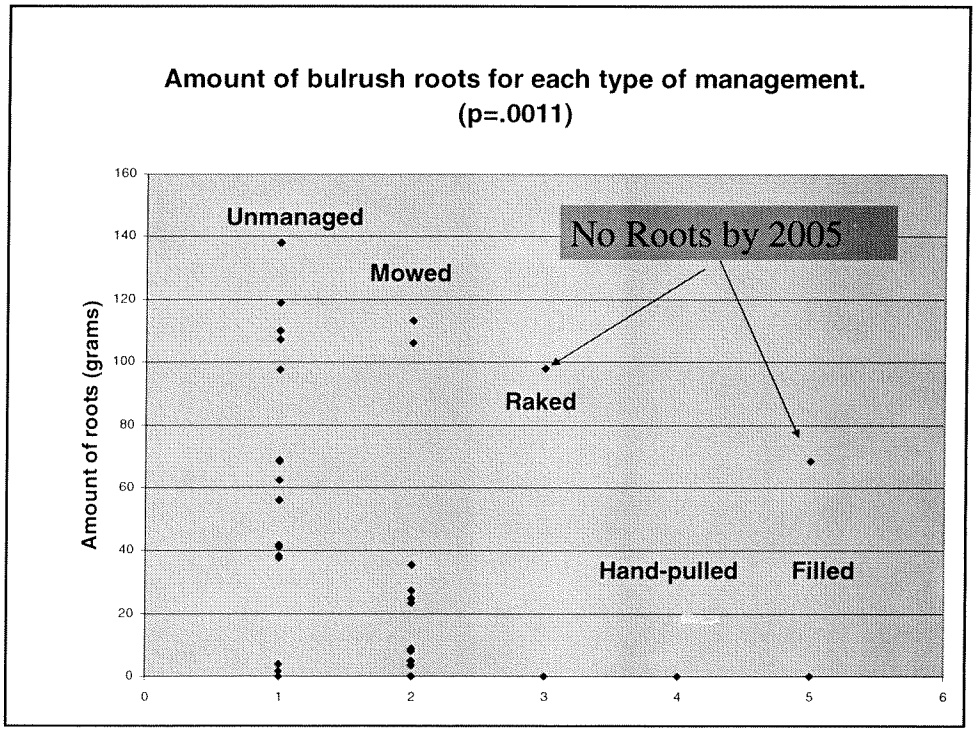

SAGINAW BAY – MOWED AND FLOODED

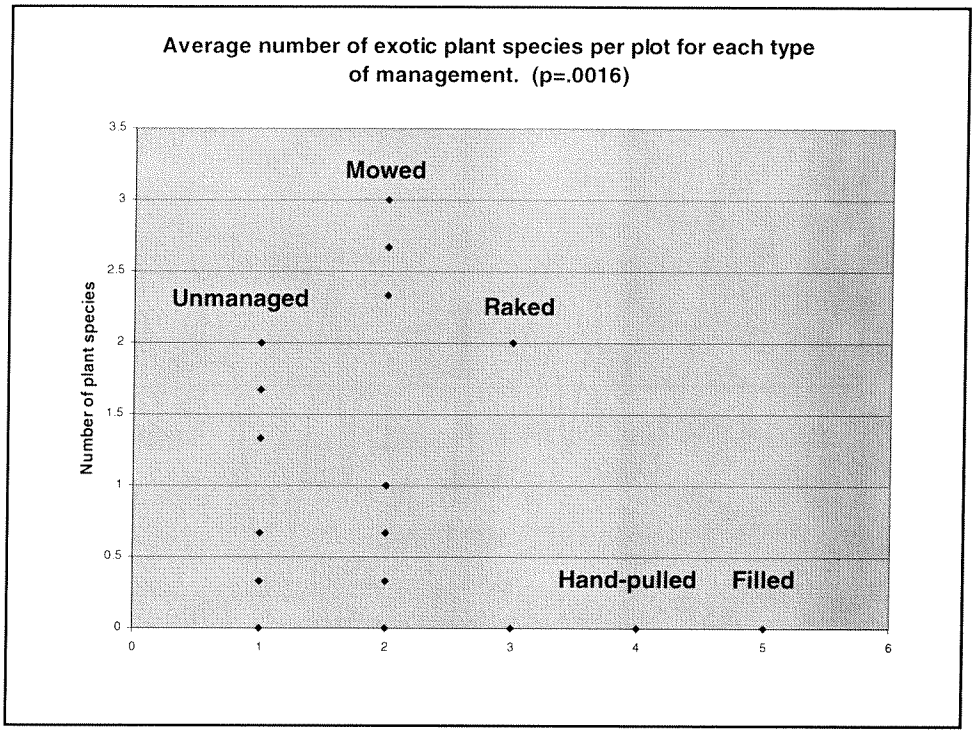

RAKED - FILLED
MOWED
CASEVILLE RESIDENT 1
HARROWED - FILLED
CASEVILLE RESIDENT 2
MOWED


SAGINAW BAY: MOWED
AND THATCH REMOVAL


HAND PULLING CAN
REMOVE ALL OR
MOST OF ROOTS

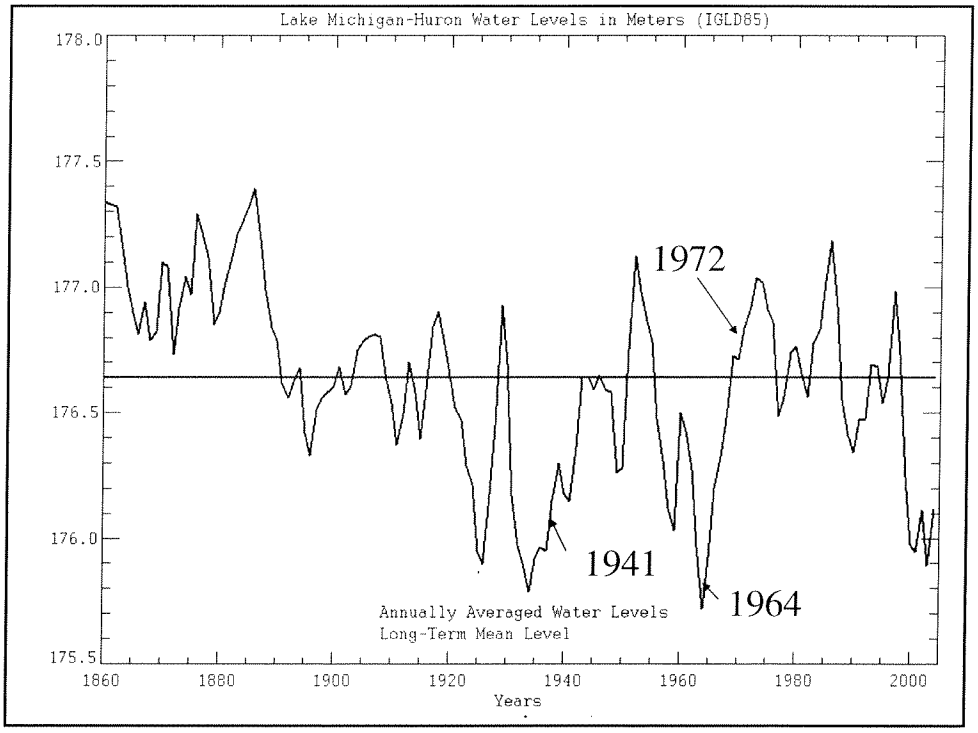

Number of bulrush stems for each type of management.
(p=<.0001)
Number of stems
120
100
80
60
40
20
0
0
1
2
3
4
5
6
Unmanaged
Mowed
Raked
Hand-Pulled
Filled

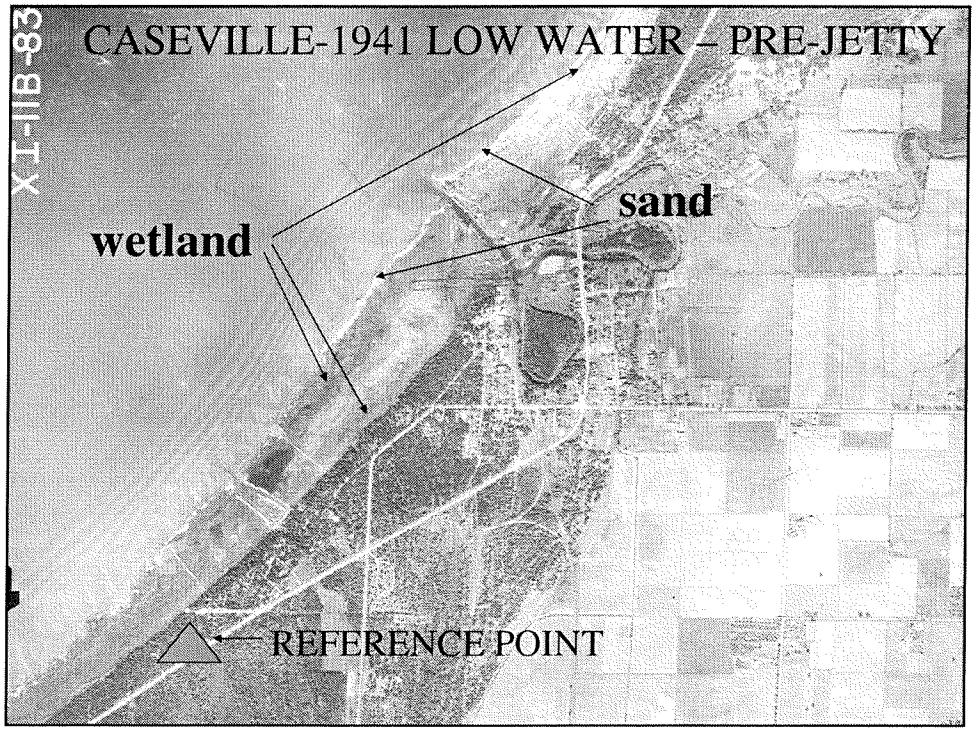

Amount of bulrush roots for each type of management.
(p=.0011)
Amount of roots (grams)
160
140
120
100
80
60
40
20
0
0
1
2
3
4
5
6
Unmanaged
Mowed
Raked
No Roots by 2005
Hand-pulled
Filled

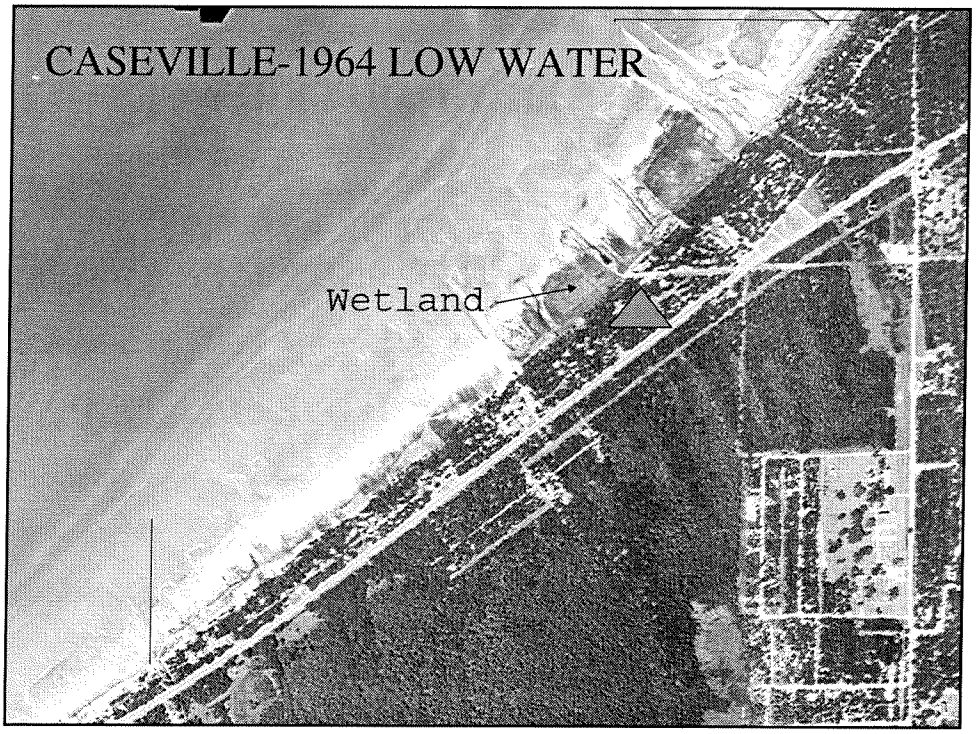


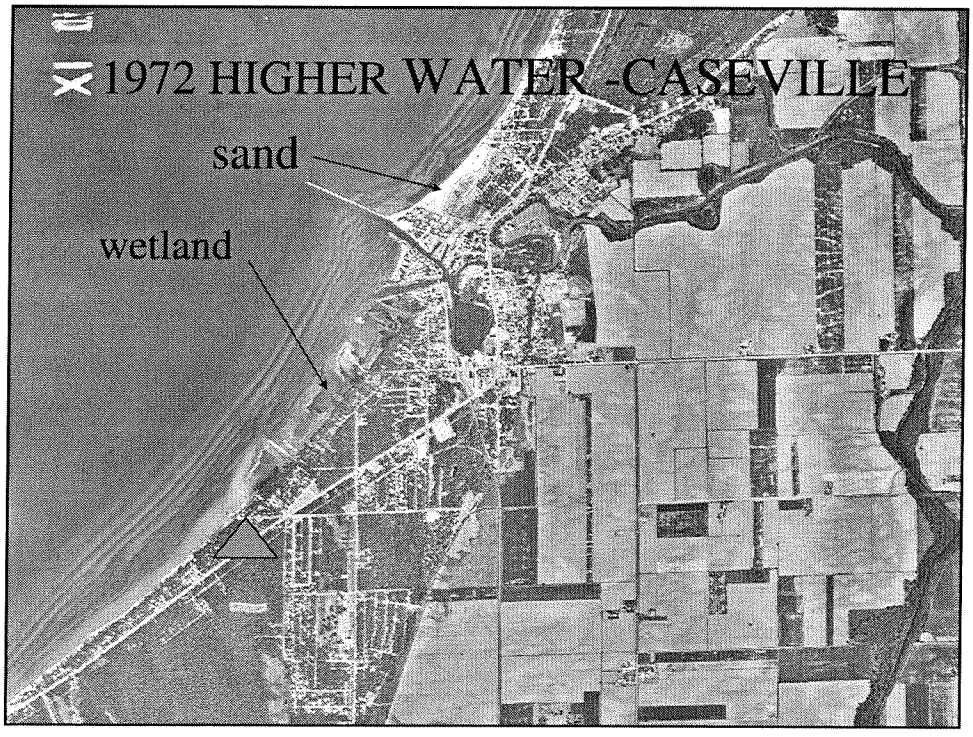
ARE CASEVILLE WETLANDS THE RESULT OF ADDING A JETTY TO THE RIVER?

NO


Lake Michigan-Huron Water Levels in Meters (IGLD85)
178.0
177.5
177.0
176.5
176.0
175.5
1860
1880
1900
1920
1940
1960
1980
2000
Years
1972
1941
1964
Annually Averaged Water Levels
Long-Term Mean Level


CASEVILLE-1941 LOW WATER – PRE-JETTY
XT-IIB-83
sand
wetland
REFERENCE POINT


CASEVILLE-1964 LOW WATER
Wetland

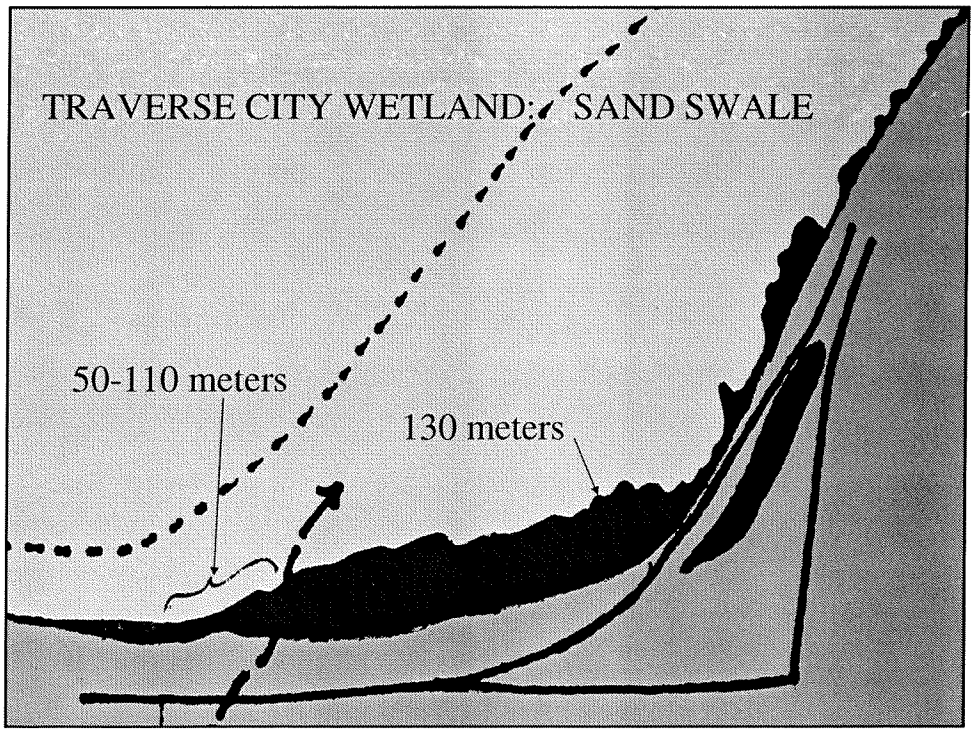

1972 HIGHER WATER -CASEVILLE
sand
wetland

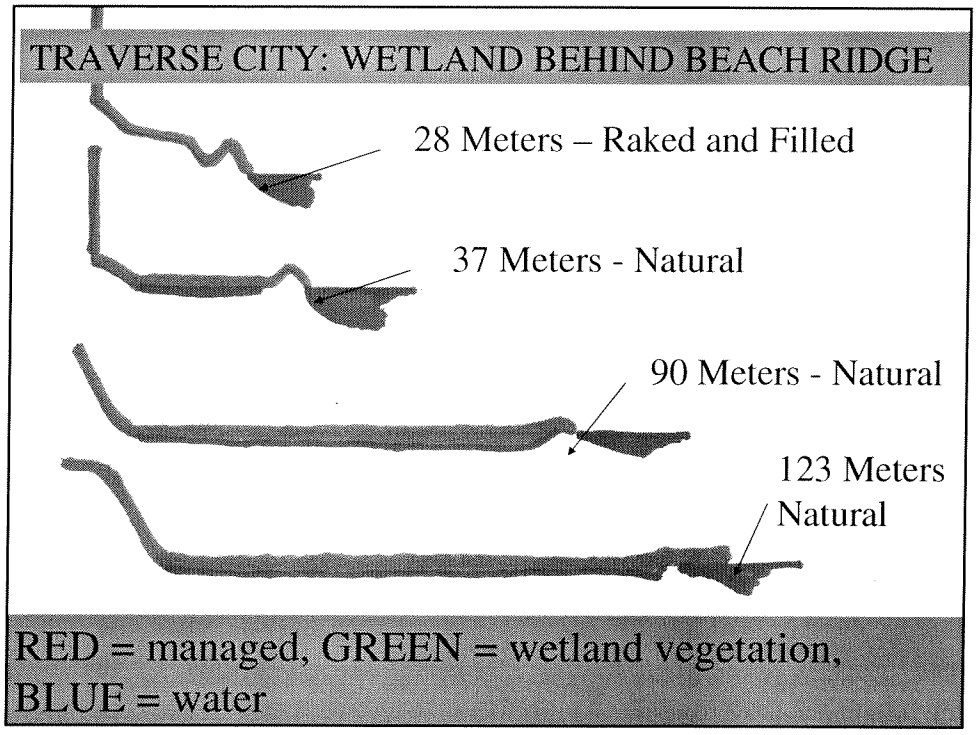
REGIONAL WETLAND DIFFERENCES

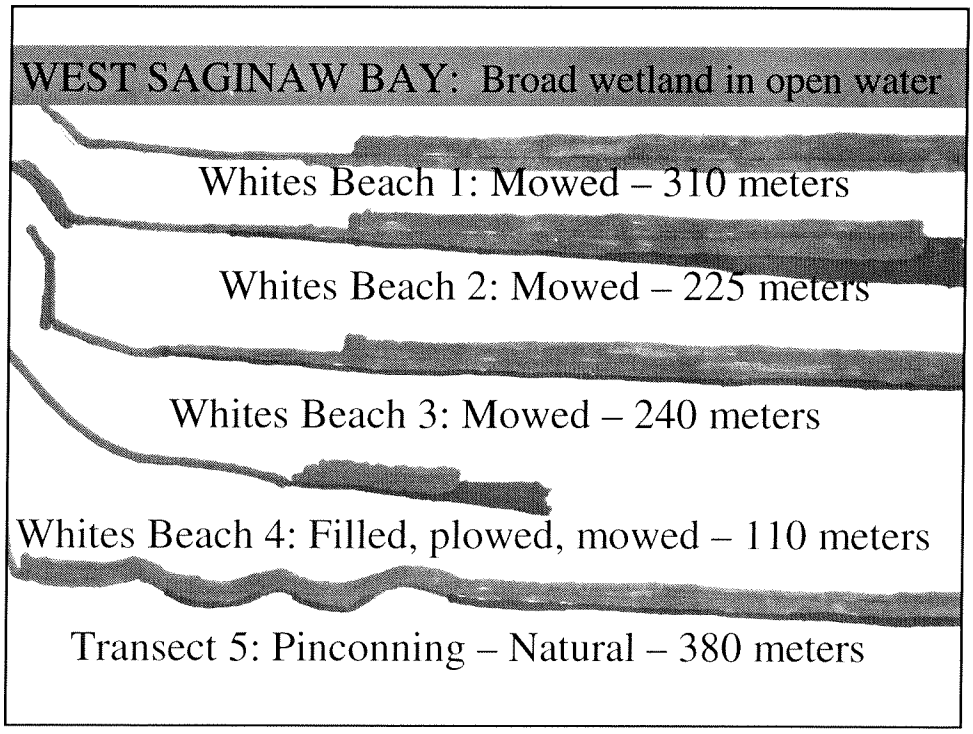
- TRAVERSE CITY – SAND DUNE AND SWALE – (WETLAND VEGETATION BEHIND BEACH RIDGE)

- WEST SAGINAW BAY – SAND OVER CLAY (BROAD WETLANDS IN OPEN WATER)

- EAST SAGINAW BAY – SAND DUNE AND SWALE (WETLAND BEHIND BEACH RIDGE OR NO VEGETATION IN OPEN WATER)



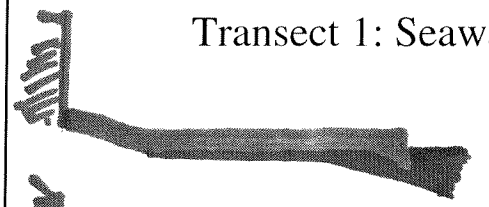

TRAVERSE CITY: WETLAND BEHIND BEACH RIDGE
28 Meters – Raked and Filled
37 Meters - Natural
90 Meters - Natural
123 Meters
Natural
RED = managed, GREEN = wetland vegetation,
BLUE = water


WEST SAGINAW BAY: Broad wetland in open water
Whites Beach 1: Mowed – 310 meters
Whites Beach 2: Mowed – 225 meters
Whites Beach 3: Mowed – 240 meters
Whites Beach 4: Filled, plowed, mowed – 110 meters
Transect 5: Pinconning – Natural – 380 meters

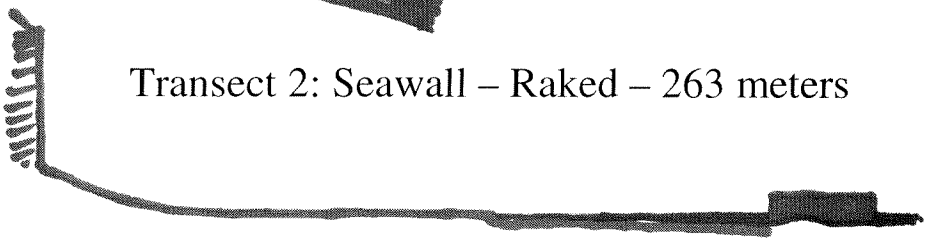
EAST SAGINAW BAY (Sand Point):

WETLAND BEHIND BEACH RIDGE

Transect 1: Seawall - Natural – 80 meters



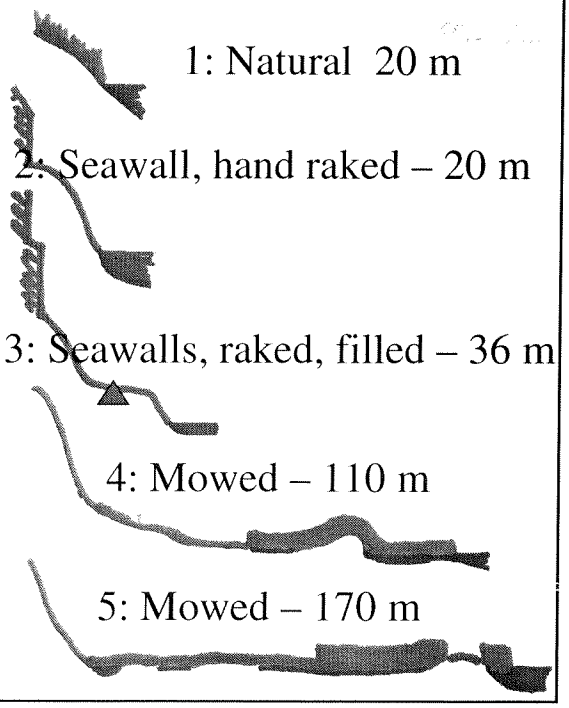
Transect 2: Seawall – Raked – 263 meters

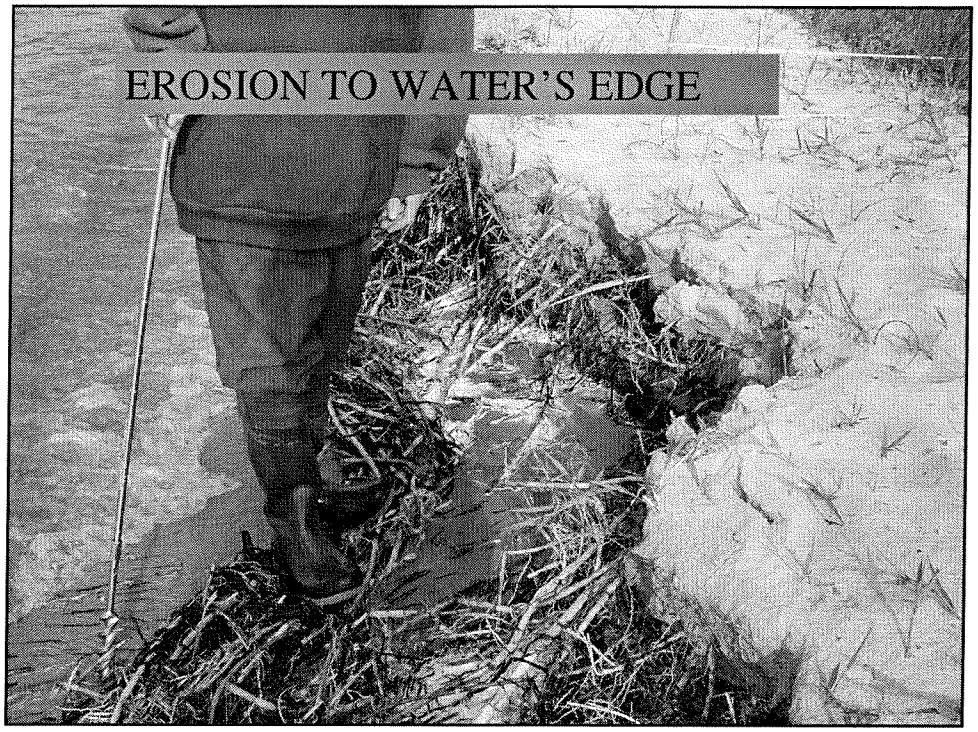


EAST SAGINAW BAY

(Port Austin Road, Caseville):

NO/FEW PLANTS IN OPEN WATER; VEGETATION IN SWALE BEHIND BEACH

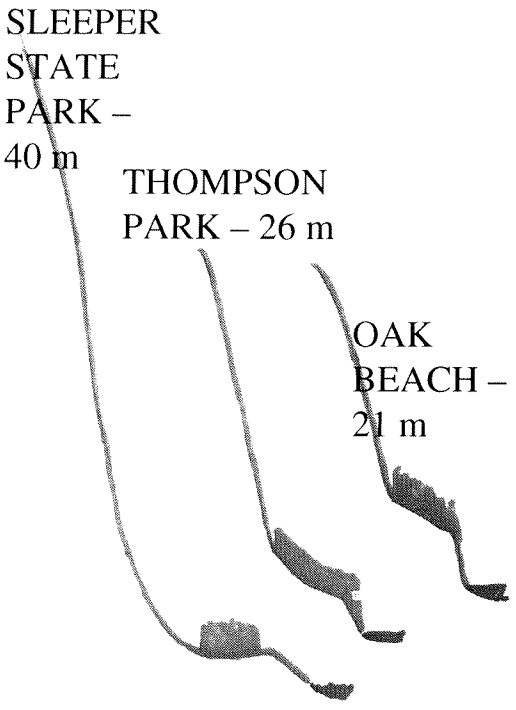


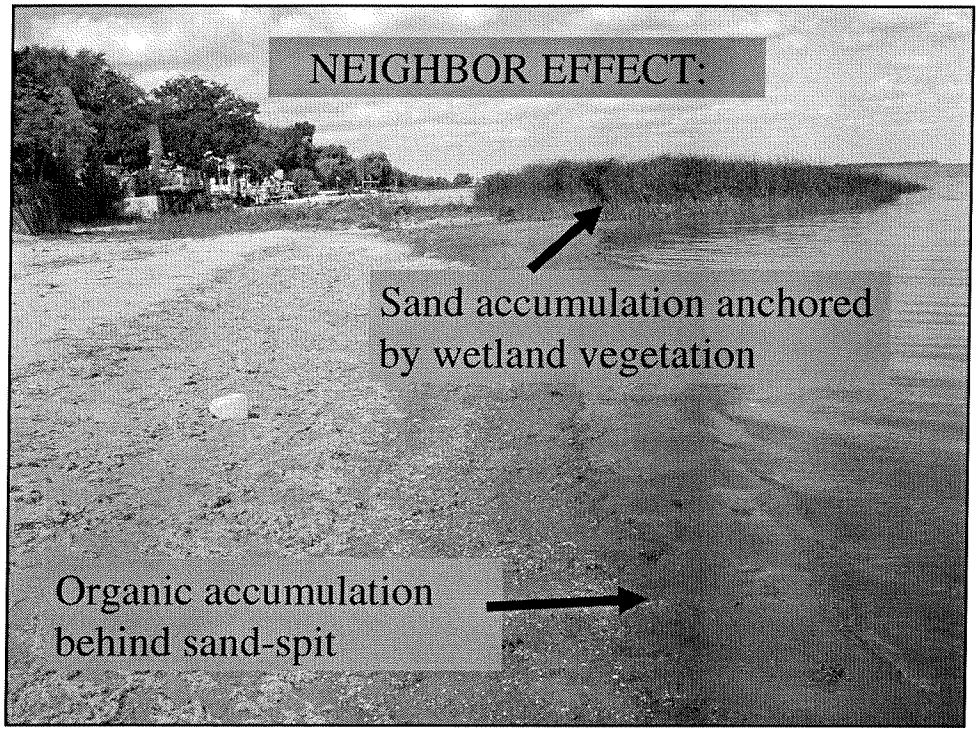


EAST SAGINAW BAY (Caseville to Port Austin):

DUNE & SWALE

NO WETLAND VEGETATION IN OPEN WATER, ONLY ON DUNE ABOVE WATER





SUMMARY

PERENNIAL WETLAND VEGETATION DESTROYED BY:

- PLOWING
- FILLING
- RAKING
- HAND PULLING

(1)**Mowing** has less short-term effect on perennial vegetation than other management approaches.

(2)Flooding may result in future bulrush mortality.

(2) Regional and local **differences in landform** partially determine permanence of wetland vegetation.

(3) Nearby **neighbors' management decisions** can alter adjacent shoreline.